Tom Holcomb, Bopi Biddanda, Anthony Weinke, Scott Kendall, and Leon Gereaux

Annis Water Resources Institute, Grand Valley State University
Muskegon, Michigan

EYES ON AN AOC: DISSEMINATING MUSKEGON LAKE BUOY OBSERVATORY DATA

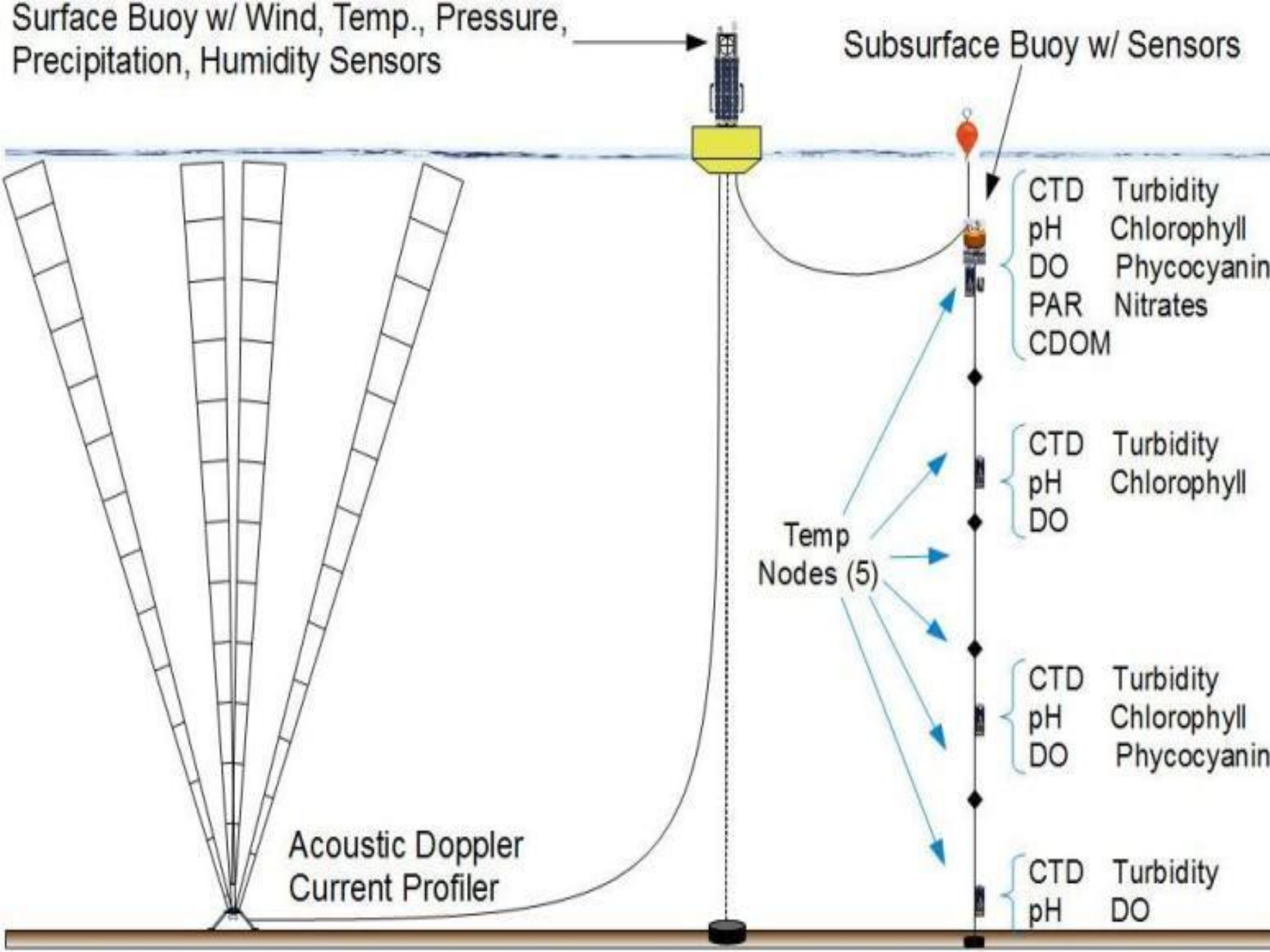
Muskegon Lake

- Drowned river mouth lake
- History of anthropogenic stress
- 1 of 10 AOCs in the Lake Michigan Basin
- Currently:
  - Shoreline Restoration
  - Remediation of contaminated sediment

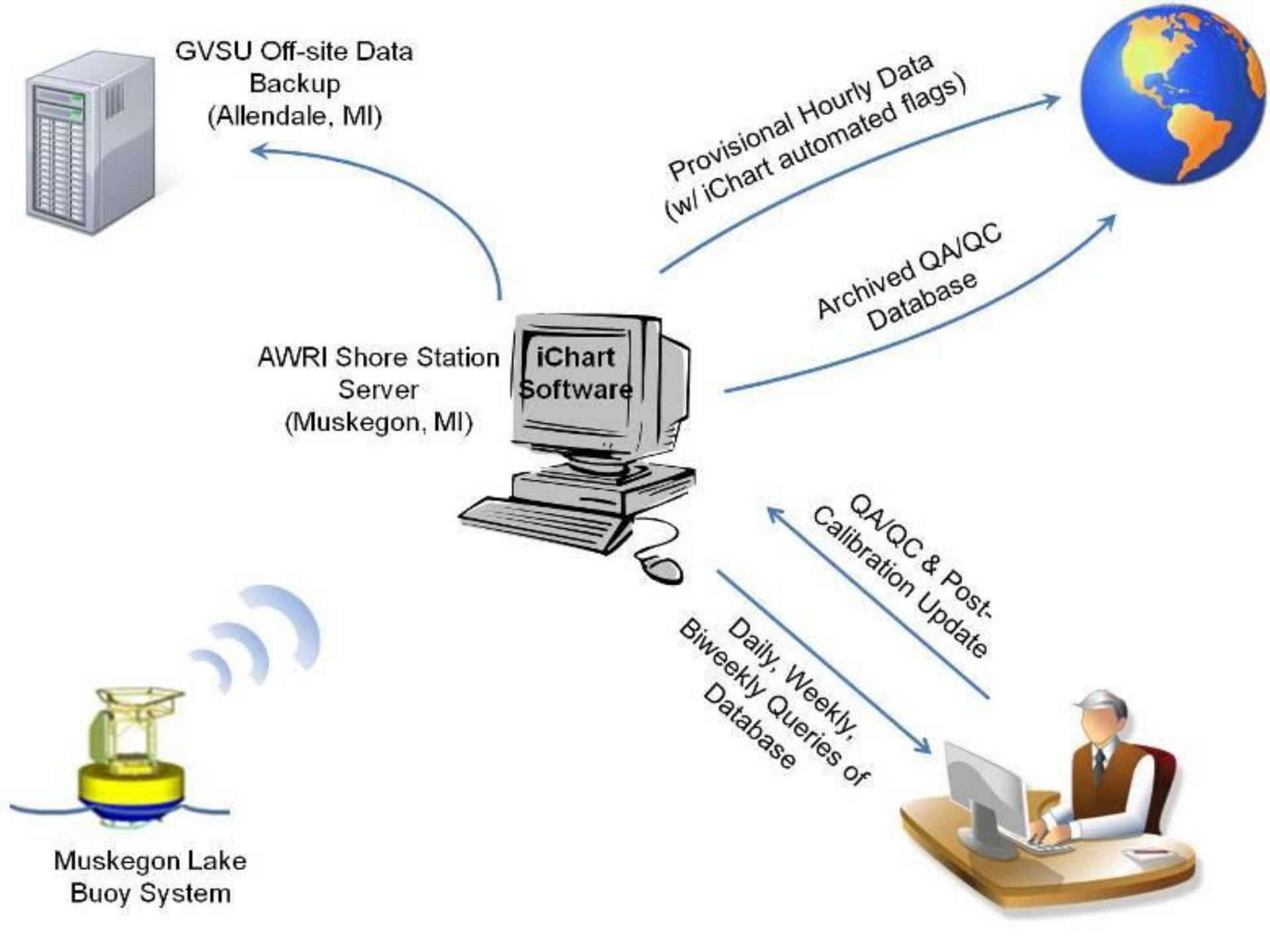
Buoy observatory

- Three year buoy monitoring observatory
- Measures meteorological, water quality, and water current parameters

Seasonal Sampling Sites and the Continuous Observatory Locations

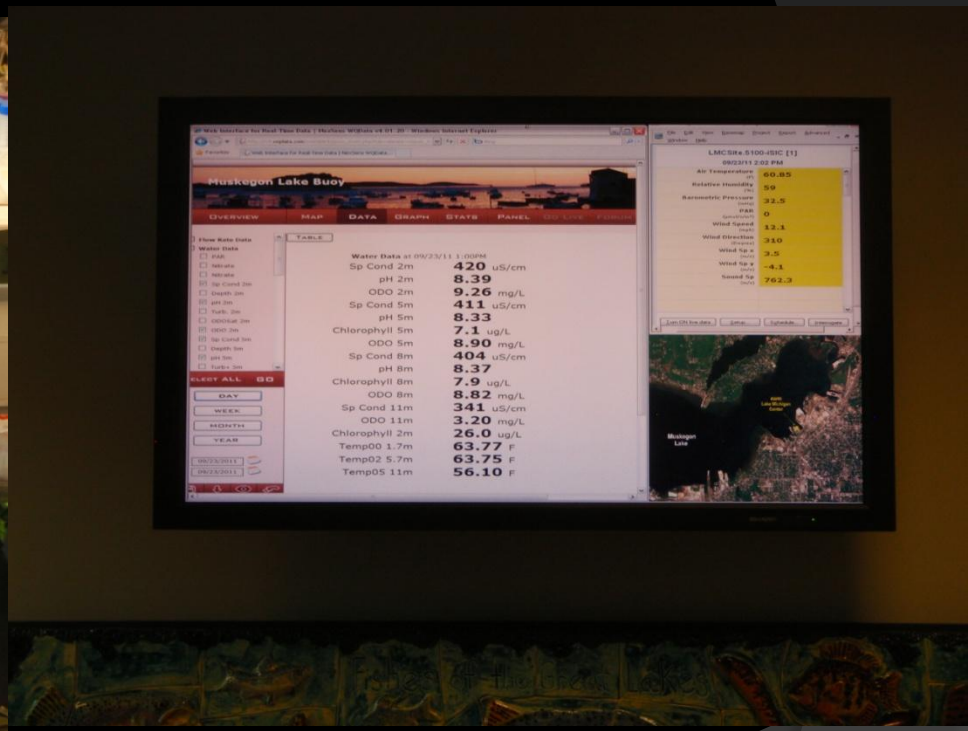

Surface Buoy w/ Wind, Temp., Pressure, Precipitation, Humidity Sensors
Subsurface Buoy w/ Sensors
CTD Turbidity
pH Chlorophyll
DO Phycocyanin
PAR Nitrates
CDOM
CTD Turbidity
pH Chlorophyll
DO
Temp Nodes (5)
CTD Turbidity
pH Chlorophyll
DO Phycocyanin
CTD Turbidity
pH DO
Acoustic Doppler Current Profiler

Where does the data go from here?


GVSU Off-site Data Backup (Allendale, MI)
Provisional Hourly Data (w/ iChart automated flags)
Archived QA/QC Database
AWRI Shore Station Server (Muskegon, MI)
iChart Software
QA/QC & Post-Calibration Update
Daily, Weekly, Biweekly Queries of Database
Muskegon Lake Buoy System

Server In Lab

Display in Hall



Troubles disseminating data beyond our institution

Individual

- Computer expertise
  - Data manipulation
- Understanding management systems already in place

Institutional

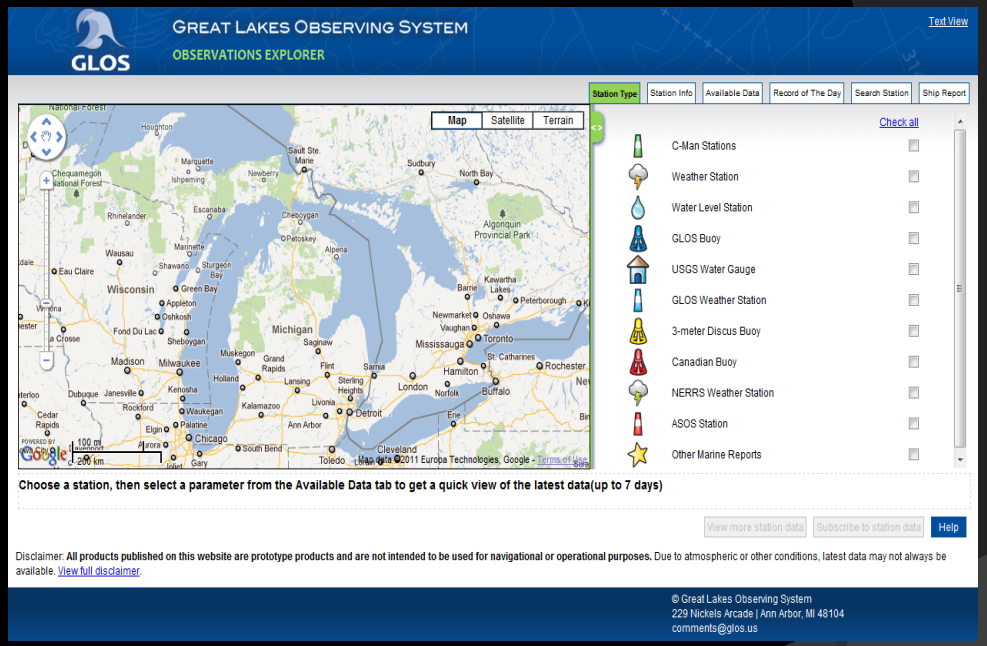
- Network constraints
  - IP Management
- Web management already in place

Observatory Collaboration

- Some standard procedures are already in place, but are they enough for AOCs?

GLOS

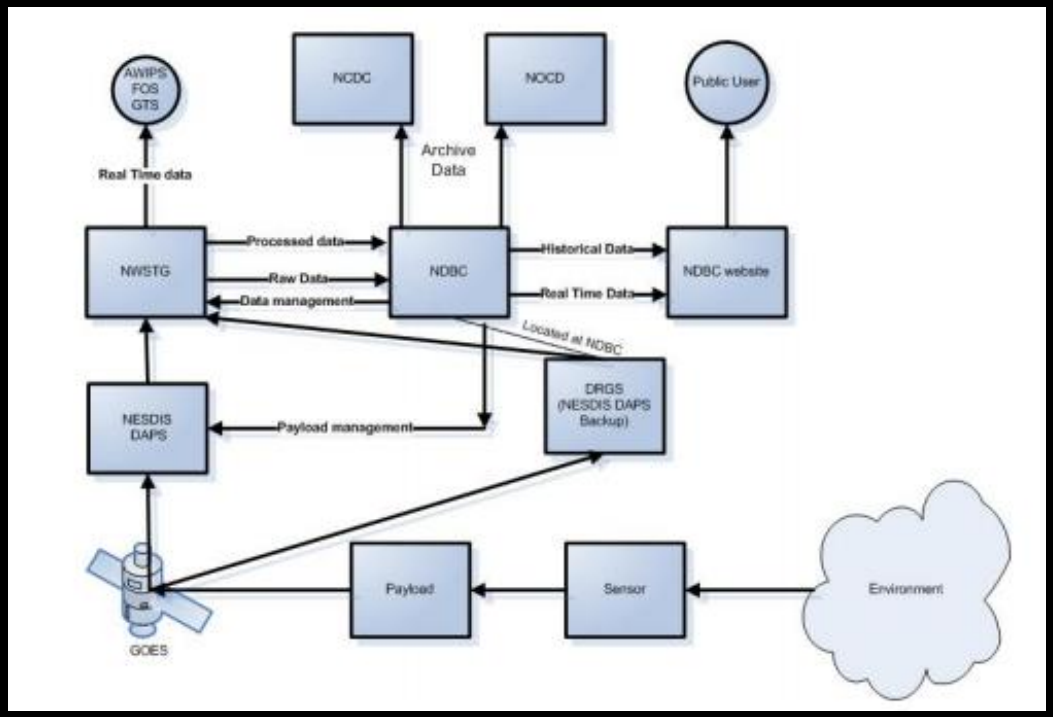
- Common site for retrieving observatory data from around Great Lakes



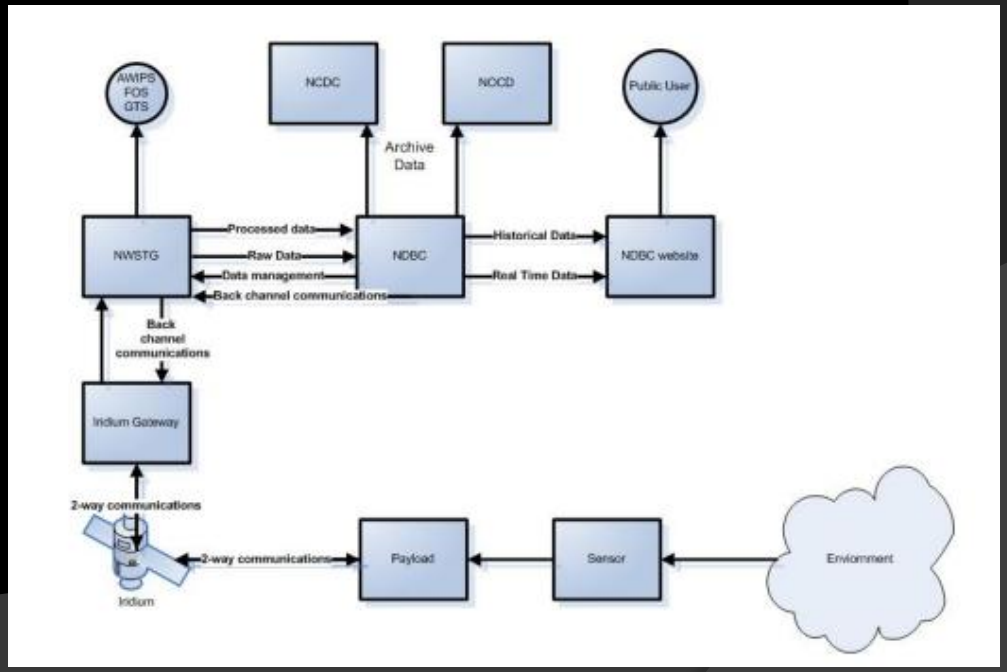
IOOS and NDBC

- IOOS Data Management and Communications (DMAC)
- NDBC Data Quality Control Checks and Procedures

Two problems integrating AOCs into these systems



Methods can be complicated



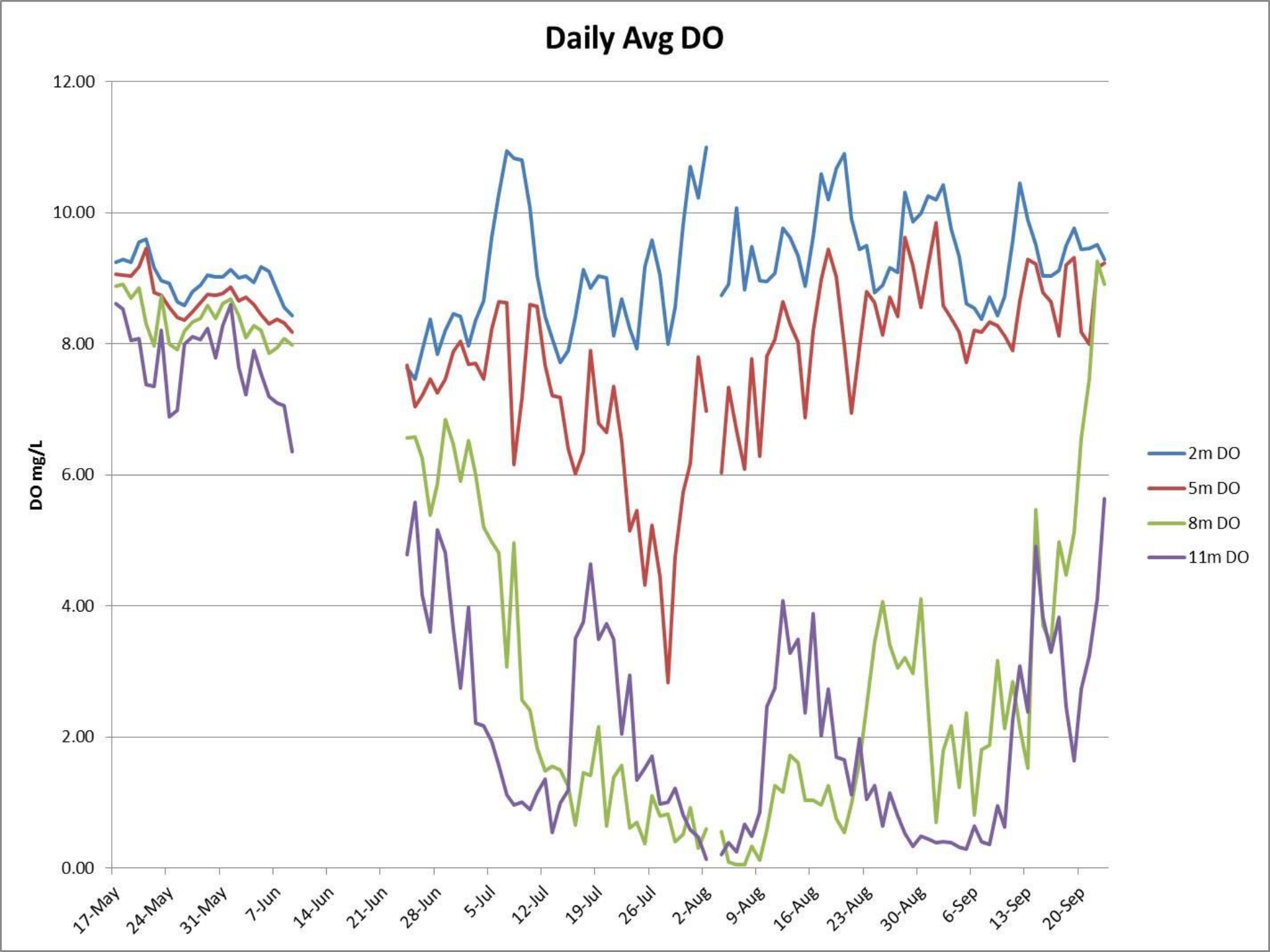
Limited number of parameters

Beyond meteorological parameters

- AOCs are concerned with a vast array of parameters
  - Biological and chemical parameters are important

Muskegon Lake BUIs

- Loss of fish/wildlife habitat
- Degradation of fish/wildlife population
- Degradation of benthos
  - Hypoxia
- Restrictions on dredging
  - Turbidity and Sediment Transport
- Degradation of aesthetics and eutrophication/undesirable algae
  - Chlorophyll and Phycocyanin


Daily Avg DO
12.00
10.00
8.00
6.00
4.00
2.00
0.00
DO mg/L
17-May
24-May
31-May
7-Jun
14-Jun
21-Jun
28-Jun
5-Jul
12-Jul
19-Jul
26-Jul
2-Aug
9-Aug
16-Aug
23-Aug
30-Aug
6-Sep
13-Sep
20-Sep
2m DO
5m DO
8m DO
11m DO

A simple step forward

- XML is already standard
- Many parameters already in place
- Integration of new parameters crucial to AOCs

- Integrate into existing systems?
- Share data at an institutional level?

Good news!

- Data is available
  - http://www.gvsu.edu/buoy
- *Key data trends will be shown*
  - *See presentation by Biddanda et al Nutrients/TMDL Session Wednesday 8.50 AM*

Thank You

- Annis Water Resources Institute, GVSU
- EPA-GLRI
- NOAA-GLERL
- GLOS and GLC
- Nexsens Technologies
- Fondriest Environmental

Questions?